Ruffin I. Rackley
2015 Creekside Circle
Anacortes, Washington, 98221
360 299-1230
Friday, June 1, 2001

Mr. Spencer Abraham, Secretary
U. S. Department of Energy
1000 Independence Ave. SW
Washington, D.C. 20585

RE: Nuclear Waste Disposal

Dear Mr. Secretary:

As a geologist active in uranium exploration since 1957 and a supporter of nuclear power, I am concerned about the lack of a solution to the problem of NUCLEAR WASTE disposal. Over the last few months, I have been thinking about a geological process that could be the solution to this problem and it has many positive aspects and only a few negative ones. The positive aspects are all physical and the negative one are all psychological and/or political. This geological process is island building by volcanoes on a deep oceanic tectonic plate where adding nuclear radioactive waste to the volcanic material near the base of the volcano would bury that material three to four miles deep as the volcano continues to spread and grow and would eliminate that material from the biosphere permanently, even in geologic terms.

Depositing and burying the waste on the lower slope of an active volcano in mid ocean :

1. would put the waste threee to four miles below sea level and well out of the life zone;

2. would be further buried by the volcano quickly if a site is selected where the volcanic rock or lava is actively flowing down the slope and ultimately buried three to four miles deep by volcanic rock and ten or more mile laterally from the open sea;

3. would never see the surface of the earth again because the much heavier oceanic crust is rarely thrust onto the surface of the continents, but maybe in 50 to 100 million years;

4. utilize water transportation via the navigable rivers from major waste sources like Hanford, Oak Ridge and those along the Ohio River to the final disposal site and also provide cooling for any waste that needs it and most importantly remove it from the vicinity of the general population;

5. would employ natural processes to provide the ultimate cover for the nuclear waste and if there is any process or place the environmentalist might accept, this is it; and,

6. convert the nuclear waste disposal problem into a transportation problem, where anything that can be put onto a ship or barge can be deposited in the appropriate area, from soil to whole Hanford and/or naval reactors.

Where is such a mid ocean volcano? There are a few hundred sea mounts and volcanic islands in the Pacific Ocean from the Aleutian Islands almost to Antarctica and other lesser piles of volcanic material and of those there are a number of active volcanoes.

A fimiliar example is the Hawaiian chain of which the islands we know as the Hawiian Islands is only a relatively small portion on the southeastern end of the chain. The chain was built over 15 to 20 million years as the ocean crust moved northwesterly over a "hot spot" which produced the series of islands which extended from the 20,000 foot deep trough to the ocean surface and extended above sea level. The older of these islands have eroded rather quickly to near the ocean surface where coral reefs have halted the erosion and stabilized the islands at or near sea level.

The Big Island of Hawaii is one of the active volcanoes and twenty miles to the southeast of the Big Island another volcano is actively building what will undoubtedly be another island, already named "Lo'ihi'. It has built about 17,000 feet above the 20,000 foot deep Pacific Ocean floor and is 3000 feet below the surface of the ocean *. I'm not sure how fast it is growing, but I do know that lava is running off the Big Island at the rate of several hundred thousand cubic yards each day and has for the past 18 years. Some of that lava or the rock solidified from it reaches the ocean floor a few miles off shore regularly, if not each day.

If the disposal of nuclear waste on mid ocean volcanoes were to be adopted, the transportation of the waste could be simplified by the use of ships and barges on which large containers, on the order of 50 to 100 tons, and their radioactive sheilding could be loaded at or near the source of the waste and transported by the navagible waterways to the coast then on to the disposal site.

The location of a site where volcanic debris is cascading down the slope of the volcano may be the optimum place to dispose of the waste by simply droping the waste containers at the place where the debris stops and accumulates and where the container would be buried in a matter of hours or no more than a few days. If such a site can not be found, it may be necessary to bury the waste containers on the lower slope of the volcano while the island continues to grow. The preparation of the site for burial would probably be done by a semi-submercable vessel which would excavate, by high pressure water jets, trenches to receive the waste containers and after placement, the jets could bury the containers by excavating another trench just up slope. (see cartoon A).

An alternate method would be to build a tool that would hold the container of waste as water jets drill a hole of the required depth then release the waste container at the bottom of the hole. the hole would then be filled by the same tool slucing debris from the up slope side of the hole until the hole is filled (see cartoon B). By either method the surface unit could have more than one excavator or tool operating at a time. In carefully located sites, a container could be buried in a few hours. When surface facilities and sea bottom trench locations can be located accurately enough the containers could be dropped into place, greatly speeding the burial process. It isn't out of the realm of possibilities that with some container design improvements a container could be dropped and it would bury itself in the debris.

Obviously a lot of detailed work would be needed to find the best spot where the volcano is directing the most lava at the time the dumping is planned, what type of barges or ships would be needed, what kind of containment, if any, is needed, and whose back yard would it be in. Of all the present sites being considered for nuclear waste disposal, Nevada, New Mexico, coral islands or deep ocean trenches, none are as environmentally or people friendly as a new mid ocean volcano would be with the waste being buried in the loose volcanic debris a few tens of feet at the time of placement and eventually miles deep as the island spreads its base.

The debris being deposited on the slopes of the volcanoes ranges in size from very large hunks of the island to fine sand size material. The best size to work in probably would be pebble to sand size which could be excavated by jets from high preasure nozzels either in the form of trenches or as holes "drilled" vertically. I'll have to admit ignorance on the behavior of debris flowing down a slope below the wave base of the ocean. I would not be surprised if the debris tended to be loose and uncompacted for perhaps 200 feet because there is nothing to sort or compact the material once it reaches its resting place. It might act like 'quick sand' which could be a benefit or a problem.

I am not looking for a job, but I would enjoy helping getting such a program started so I put myself at your service as long as it doesn't cost me money. If you would like to check my credentials, you might contact John Wold, former Congressman from Wyoming and a friend of Dick Cheney. Much of my geologic work was in Wyoming where I got to know John Wold in 1964 when he was the Republican candidate for U. S. Senate. His office in Casper, 307 265-7252, knows where he is but he spends some of the winter in Arizona at 623 935-4397.

Sincerely,

Ruffin L Rackley

Copy:VP Cheney
File:Nuc/wastel,a,c 6/1/01

*http://www.hawaii.com/geo.html

Cartoon A

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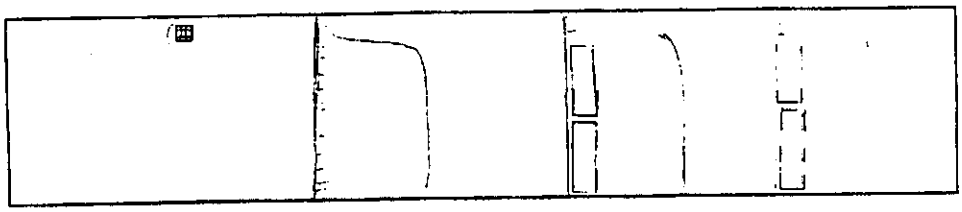
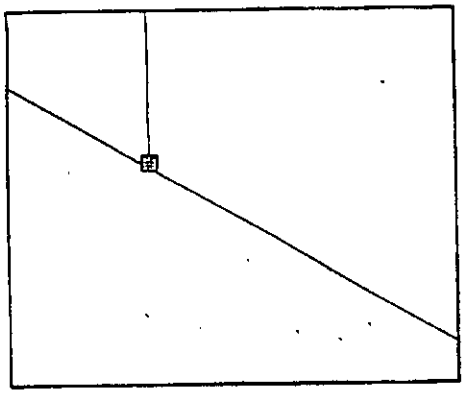
Plan of submarine trench for Nuclear waste disposal



Profile of stages of trenching for nuclear waste disposal



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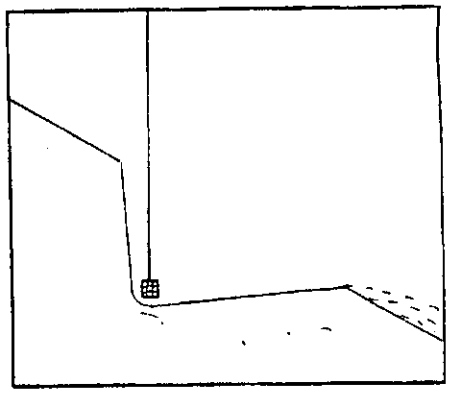
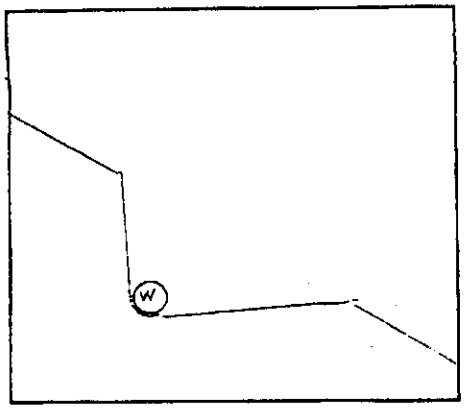
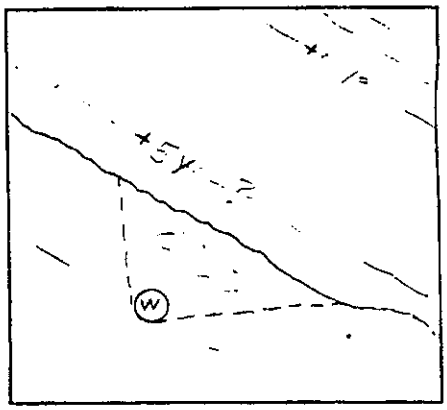


finished trench



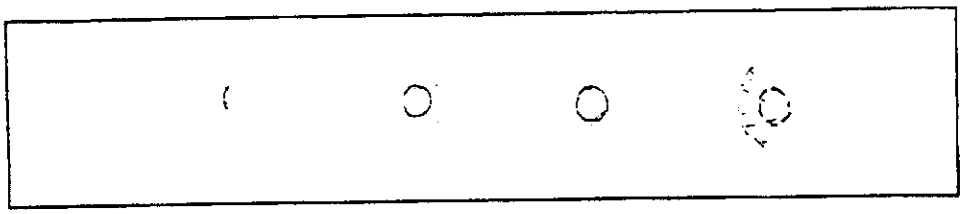
waste in place



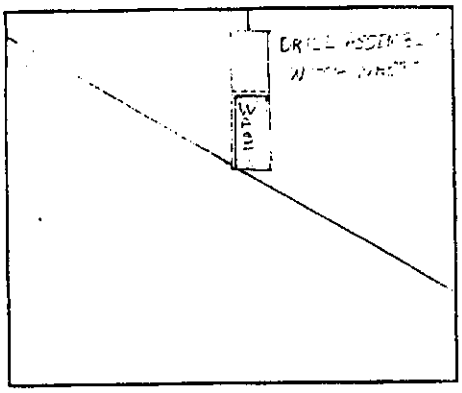
buried

Cartoon B

Plan of submarine drill holes for nuclear waste disposal



Profile of stages ofsubmarine drilling for nuclear waste disposal



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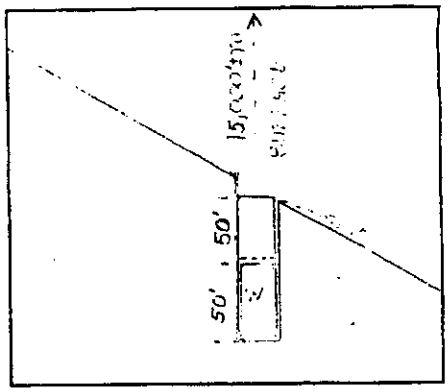
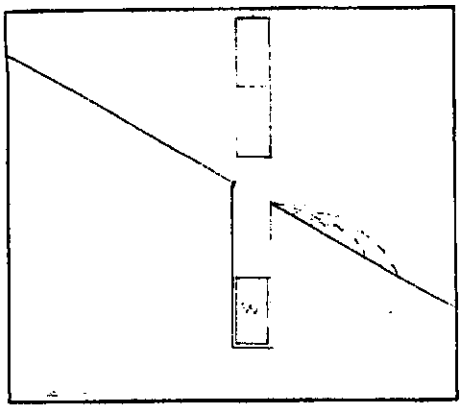


finished drill holes



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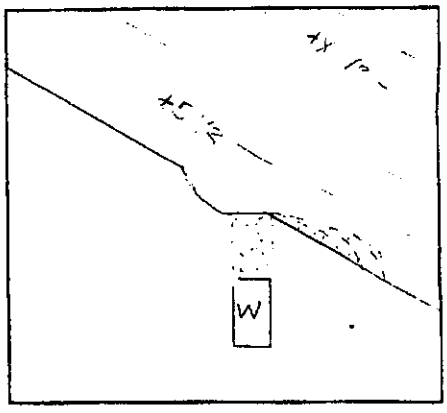

buried